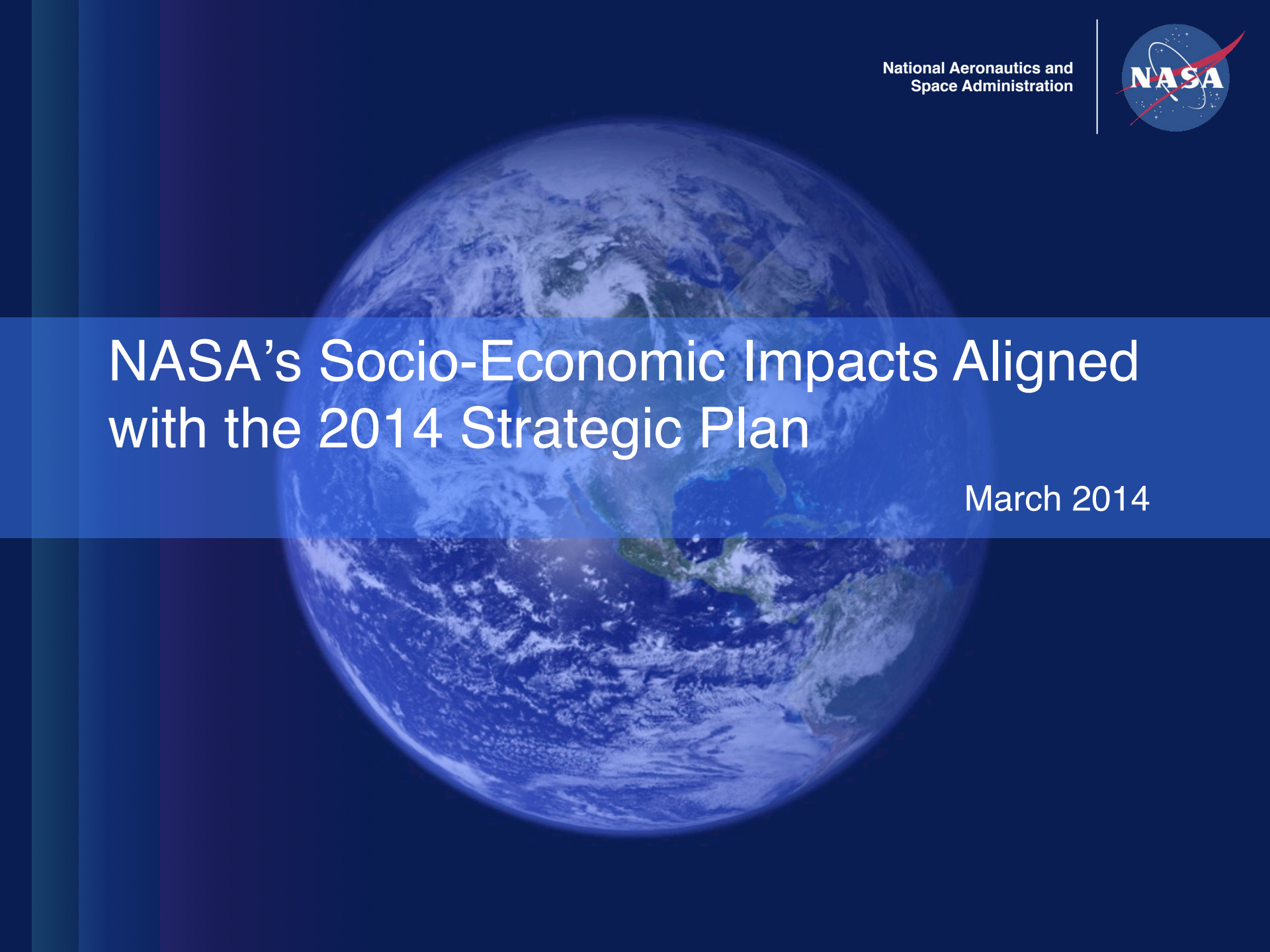
National Aeronautics and Space Administration



NASA's Socio-Economic Impacts Aligned with the 2014 Strategic Plan

March 2014

VISION

We reach for new heights and reveal the unknown for the benefit of humankind.

MISSION

Drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth.

CORE VALUES

- Safety
- Integrity
- Teamwork
- Excellence

OVERARCHING APPROACH

Invest in next-generation technologies and approaches to spur innovation;

Inspire students to be our future scientists, engineers, explorers, and educators through interactions with NASA's people, missions, research, and facilities;

Expand partnerships with international, intergovernmental, academic, industrial, and entrepreneurial communities, recognizing their roles as important contributors of skill and creativity to our missions and for the propagation of our results;

Commit to environmental stewardship through Earth observation and science, and the development and use of green technologies and capabilities in NASA missions and facilities; and

Safeguard the public trust through transparency and accountability in our programmatic and financial management, procurement, and reporting practices.

NASA's Strategic Goals

NASA plays a critical role in the national economy by:

- Driving technology and accelerating U.S. industry
- Spurring innovation and growth
- Building and sharing knowledge
- Promoting collaboration with U.S. industry
- Enhancing safety and quality of life
- Creating economic opportunities and public value

These goals build upon accomplishments NASA has made in the areas of science, technology, and education

GOAL 1:

Expand the frontiers of knowledge, capability, and opportunity in space

GOAL 3:

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure

GOAL 2:

Advance understanding of Earth and develop technologies to improve the quality of life on our home planet

Strategic Goal 1:

Expand the frontiers of knowledge, capability, and opportunity in space

Science

Expand the frontiers of knowledge, capability, and opportunity in space

10,000 **Scientific published papers** based on data from NASA's Hubble Space Telescope

20 **NASA missions** continuously observing the Sun for science and space weather forecasting

LIDAR technology from NASA Mars landers currently used with cameras in cars and trucks to avert collisions

Miniaturized camera technology originally used on spacecraft now used in 1 out of 3 cellphone cameras

NASA-developed in-ear infrared thermometers technology used by billions of people worldwide to measure instantaneous body temperature

NASA's science mission covers the Earth, the Sun, the solar system, and the universe. Results inform how the Earth works as a system, how it compares to other planets, how space weather impacts our lives, and our understanding of the universe's composition

The International Space Station

Expand the frontiers of knowledge, capability, and opportunity in space

200 **People** who have visited the ISS by the end of 2013

1,500 **Scientific investigations** performed aboard the ISS from 1998 to 2013

1,400 **Peer-reviewed published papers** featuring research conducted on ISS from 1998 to 2013

42M **Students** reached through ISS educational events from 1998 to 2013

$1.5B **Estimated future commercial revenue** from Falcon 9 and Antares launches booked by private sector (as of Feb 2014)

ISS research has contributed to advances in health, environmental sciences, education, and has helped revitalize the U.S. launch industry

NASA Collaboration

Expand the frontiers of knowledge, capability, and opportunity in space

5,000 **Participants** across 117 teams in NASA Challenges work to solve some of the Agency's toughest problems

1.2M+ **People** from over 80 countries participating in NASA citizen scientist projects

7,000 **Businesses** and other organizations that had contracts with NASA in 2013

1,300 **Research projects** funded in 2013

500 **Companies** collaborate with NASA to perform work documented in Space Act Agreements

100+ **Agreements** with international entities from 28 countries were signed in 2013

NASA works with U.S. industry, academia, and international partners to expand the frontiers of knowledge, capability, and opportunity in space

Commercial Cargo

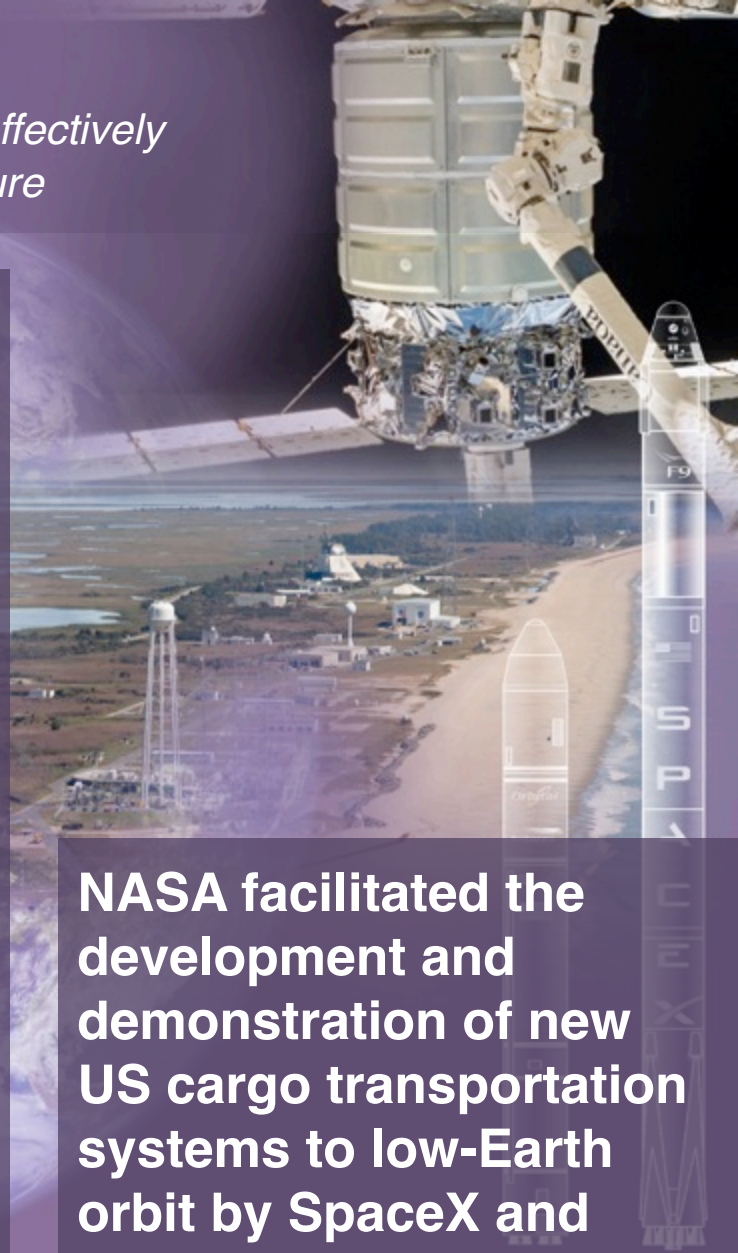
Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure

$782M NASA investment resulting in two new launch vehicles, two new autonomous spacecraft, and two new launch complexes and mission control centers for less than half the cost to develop these new capabilities

First NASA program since development of the Space Shuttle to successfully result in new integrated space transportation systems capable of carrying cargo to and from LEO

Follow-on CRS operational missions eliminated the need to purchase Progress cargo missions to the ISS from Russia, reestablishing ISS cargo return capability in the US

Recapturing launch market share with U.S. commercial capabilities—50 government and commercial launches on SpaceX manifest alone



NASA facilitated the development and demonstration of new US cargo transportation systems to low-Earth orbit by SpaceX and Orbital Sciences

Strategic Goal 2:

Advance understanding of Earth and develop technologies to improve the quality of life on our home planet

Earth Observation

Advance understanding of Earth and develop technologies to improve the quality of life on our home planet

9.8PB **Volume of data stored** at NASA's Earth Observation System Data and Information System (EOSDIS) by FY 2013

636M **Data products downloaded** from EOSDIS

3M **Downloads** of scenes captured by NASA Earth observing missions conducted or under development since 1960 NASA-built Landsat

71 **NASA Earth observing missions** conducted or under development since 1960

82% **NASA Earth Science satellites** in 2013 through interagency and international partnerships

In a NASA partnership with USAID, the government of Malawi used satellite imagery to manage land use of Mulanje Massif in southern Malawi

In partnership with the U.S. Forest Service, NASA's Ikhana remotely piloted Predator B aircraft was used to develop imaging and mapping techniques to fight wildfires

The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite was used to identify hotspots during the 2013 Yosemite wildfires

Aeronautics

Advance understanding of Earth and develop technologies to improve the quality of life on our home planet

$1,700 — **Estimated per flight cost savings** due to introduction of NASA-developed air traffic management concepts and decision support tools, in partnership with the FAA and airlines

$300M — **Estimated savings** to the air traffic control system expected when jointly developed NASA and FAA concepts to better manage aircraft operations near congested terminals are adopted

5 min — **98% reduction in analysis time** (from 180-240 minutes to 5 minutes) using NASA-developed static code analyzer that automatically reviews large-scale software systems for errors without needing to run the software

4B gal — **Amount of jet fuel saved** by aircraft using NASA-developed winglets and reducing carbon dioxide emissions by 43M tons

50% — **Reduction in repair time** due to data from NASA-developed small, embedded wireless sensors in helicopter blades

The U.S. aviation industry accounts for $1.3 trillion in economic activity and 10 million jobs. Every U.S. commercial aircraft and U.S. air traffic control tower has NASA-developed technology on board.

Knowledge Transfer

Advance understanding of Earth and develop technologies to improve the quality of life on our home planet

1,600 **Potential new inventions** generated by NASA civil servants and contractors in FY 2013

2,150 **Number of new domestic partnerships** or technology transfer agreements, which includes Space Act Agreements and Software Usage Agreements and Licenses in FY 2013

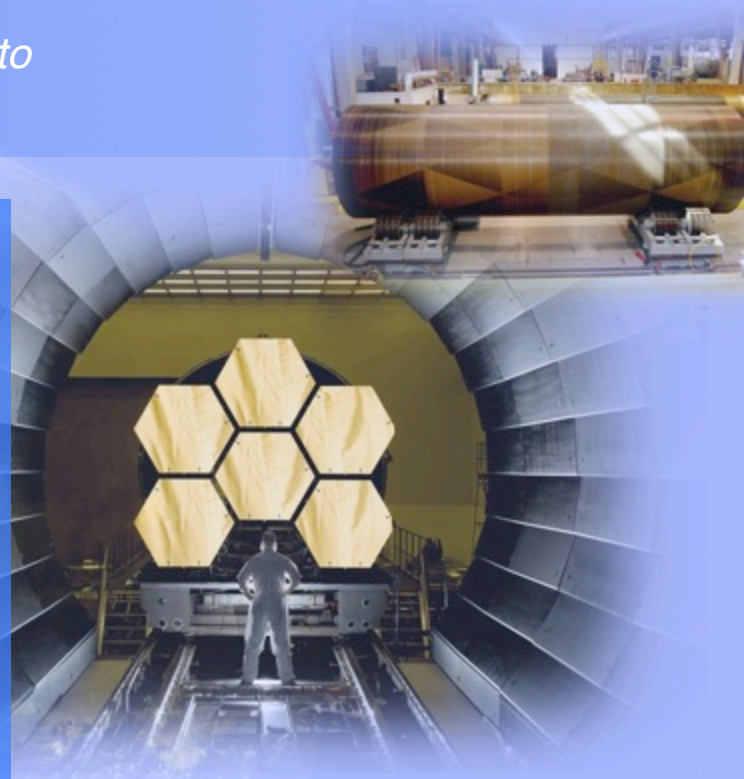
1,000 **Number of agreements** with federal, state, and local governments

500 **Number of companies** NASA collaborates with using Space Act Agreements

1,800 **Documented spinoffs** from NASA technologies that have been commercialized, ranging from innovative manufacturing techniques to new materials

>1B **Estimated number** of cell phones sold each year since 2010 using NASA-developed imaging semiconductors

500 yrs **Length of time** a semiconductor can last based on NASA-developed manufacturing techniques



NASA transfers its knowledge, products, services and processes to spur innovation in U.S. industry and help American businesses grow.

Strategic Goal 3:

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure

NASA Centers

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure

NASA and its Government Partners

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure

870 active interagency agreements with NASA Federal partners. Examples include:

- Longstanding partnership with National Oceanic and Atmospheric Administration on weather satellites
- Four-decade initiative with the U.S. Geological Survey on land-remote sensing programs, such as Landsat
- Partnering with the Federal Aviation Administration to develop standards for emerging commercial human space flight and to enable the Next Generation Air Transportation System, or NextGen
- Close coordination with Department of Defense on engine development for space launch, on potential future space systems like space planes, and on unmanned aerial vehicles.

NASA works extensively with its federal partners to share expertise and facilities to avoid duplication of effort and maximize mission objectives

Collaboration with federal partners advances research and cutting edge technologies

Education and Outreach

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure

1B **Number of visits** and downloads of NASA datasets in 2012

60M **Number of views** of NASA educational websites each year

12M **Number of Twitter followers,** more than any other government agency

1.5M **Number of NASA mentions** in English language academic articles during the previous decade

9,000+ **Number of students** who applied for NASA internships in FY 2013

1,200+ **Number of NASA internships** awarded to in FY 2013

50% **Percentage of world renowned scientists** who cite Apollo as a major reason they pursued a science career

In 2012, the Curiosity rover landing on Mars was viewed 3.2 million times

NASA has won multiple Shorty Awards for best government use of social media and emphasis on getting children interested in space

NASA's Annual Socio-economic Impacts

Expand the frontiers of knowledge, capability, and opportunity in space

10,000
Papers based on Hubble Space Telescope data published

1,300
Research projects funded by NASA

7,000
contracts between NASA and businesses

NASA has contracts with companies in all 50 states

1,000
Requests by U.S. industry for human spaceflight technologies

$1.5B
Estimated value of private sector bookings for Falcon 9 and Antares launches

200 people have visited the ISS

1,500 investigations conducted on ISS

Advance understanding of Earth and develop technologies to improve the quality of life on our home planet

636 million
EOSDIS imagery data downloads

3 million
Landsat scenes downloaded

4 billion gallons
Jet fuel saved due to use of NASA-developed winglets on aircraft

$1,700
Amount saved per flight due to use of NASA-developed air traffic control technologies

90%
Percentage of baby food that has a nutritional supplement identified via NASA research

30,000
Lives saved from using NASA-developed satellite tracking systems

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure

1,600+ new technology inventions in FY 2013

Software usage agreements in FY 2013

Patent and copyright licenses in FY 2013

Space Act Agreements and SBIR/STTR contracts in FY 2013

2,150+ domestic technology transfers

Visits and downloads of NASA datasets in 2012 — 1B

12M — Twitter followers *(NASA programs, people, and centers)*

60M — Views of educational websites per year

Conclusion

For less than half a percent of the federal budget, NASA is immersed in some of the greatest challenges in science and technology, learning from the past and planning decades into the future

In the course of accomplishing its mission, NASA plays a critical role in the national economy by:

- Driving technology and accelerating U.S. industry
- Spurring innovation and growth
- Building and sharing knowledge
- Promoting collaboration with U.S. industry
- Enhancing safety and quality of life
- Creating economic opportunities and public value

For additional information please visit:

The NASA Socio-Economics Report by the Office of Strategy Formulation
http://www.nasa.gov/sites/default/files/files/SEINSI_FinalReport_April13.pdf

Measuring the Socio-Economics of Earth Observations by the Earth Science Division
http://appliedsciences.nasa.gov/pdf/SocioeconomicImpactsPrimer.pdf